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Journal of the Society of Arts.

FRIDAY, SEPTEMBER 11, 1863.

NOTICE TO INSTITUTIONS.

The Programme of the Examinations for 1864 is now ready, and may be had *gratis*, on application to the Secretary of the Society of Arts.

The Papers set at the Final Examinations held in May last are also published, and may be had of the Society's publishers, Messrs. Bell and Daldy, Fleet-street, price sixpence.

BRITISH GUIANA AT THE INTERNATIONAL EXHIBITION.

At the Local Exhibition of the Natural History Society of British Guiana, held at George Town on the 1st ult., the Hon. W. Walker—President of the Society, and Chairman of the Committee of Correspondence of the Royal Agricultural Society of the Colony, which has been chiefly instrumental throughout in collecting and forwarding specimens for the various International Exhibitions—distributed the medals and honourable mentions awarded at the London International Exhibition to the successful exhibitors. On that occasion Sir W. H. Holmes, the Colonial Commissioner, who acted in London for British Guiana, submitted a very interesting report, from which the following extracts are taken:—

Little is known in England of our colony. It is generally classed amongst the West Indian Islands; indeed, it is often quoted as an island. Few are aware of the relative positions of Demerara and Guiana, for it appears that the county is far better known than the province. Our geography, history, or productions, even among the educated classes, are comparatively ignored. Unless intimately connected with the colony few had any idea that the area of British Guiana exceeds that of Great Britain; that its climate, though tropical, is salubrious—that it is watered by gigantic rivers whose sources are far away in the untrodden regions of the empire of Brazil, or in the Republic of Venezuela—that these rivers and their tributaries form a net-work of internal navigation unparalleled in other countries, and flow through thousands of miles of virgin forests, through territories abounding in tropical productions, and through soils of wonderful fertility—that our Flora and Fauna are still but partially determined, while our mineral resources have as yet been left unexamined; in fact, that but a mere edging of our vast territories is settled or cultivated—yet this portion, in 1861, exported over 70,000 hhds. of sugar, 30,000 puns. rum, and about a million cubic feet of timber, valued in round numbers at £1,500,000. Taking our population at 150,000, this shows an export of £10 per head derived solely from the produce of the soil, more than double that of manufacturing England. In many instances, those to whom I related this state of affairs were rather incredulous, and it was only after investigating the map of South America, and examining our contributions, that they began to realise the value and resources of the colony. To the ordinary visitor—I fear to some of our colonists—the collection exhibited appeared, with the exception perhaps of the specimens of natural history, but little attractive. Samples of sugar, vials of rum, bottles of all sizes containing specimens of flour, starches, oils, pigments, rough barks, fragments of fibre, samples of

gutta percha, caoutchouc, and slabs of timber, were hurriedly glanced at by the generality of visitors.

But in England, where trade is subdivided into systems of "specialities," almost every article became the object of minute investigation. Thus in turn the merchant, manufacturer, chemist, artist, and, though last not least, the amateur, were eager inquirers as to the price, quantity, quality, and when and on what terms such an article could be delivered.

It was at this point I was obliged to admit that, although every article could be produced or obtained in large quantities, that labour was scarce, and fully occupied in cultivating the recognised staple; that many parts of our land were difficult of approach, and that, consequently, it would not be very easy to obtain many articles in such quantities as were desired.

The specimens we exhibited were necessarily small, and the universal cry was for larger samples, "about a hundred-weight" was required to adapt machinery, and to enable a thorough investigation to be carried out. We are all here aware how difficult it would be to supply such an amount of many of the things we exhibited, and it is at this stage that Government or some other extraneous aid becomes necessary, if we are desirous of introducing new materials into our general commerce.

I shall now proceed to notice the awards of the Juries. British Guiana received 38 medals and 19 honourable mentions, in all 57 prizes. In this respect we were fourth on the list of British colonies, a position of which I think we may be justly proud, when we take into consideration the wealth and population of Canada and of the Australian colonies, and the great preparations and outlay which they made to be adequately represented. For instance, the timber trophy of one of the minor of these colonies cost more than the whole expenses of our department in England. In reviewing the awards of the Juries, I shall, for convenience of reference, adhere to the divisions or sections of the local catalogue.

SACCHARINE PRODUCTS AND ARTICLES OF FOOD.—

Under this section we received nineteen medals and eight honourable mentions. Six medals were awarded to our principal staple, sugar. The vacuum pan descriptions were considered as good in colour and quality as it was possible to make under this particular process. There was a specimen from the Mauritius, the grain of which was as large as the ordinary crystals of sugar candy; it received a medal, but it was more a fancy article than one required for general purposes. Ordinary muscavado from Cuming's Lodge estate was awarded a medal, and compared not unfavourably with the best qualities of Barbadoes sugar in its immediate vicinity.

Rum.—Five medals and five honourable mentions were awarded to this article. Our qualities ranked next to those from Jamaica, which always command the highest prices, indeed rum seems a sort of "speciality" of that island; the distilleries there are not on so large a scale as ours. The superiority of the spirit seems, in a great measure, due to the care in its preparation, and to an abundant supply of running water.

Boughton's Curaçoa, composed of pure spirit, sugar, and fruits, obtained a medal; it was remarkable for its fragrance, and was considered by the Jury about the most successful liqueur exhibited, a verdict practically borne out by public opinion, for all the samples so rapidly disappeared that it was found advisable to substitute dummy bottles for the veritable compound.

The series of flours, farinas, meals and starches exhibited received five medals—four of which were awarded to our farmers. It is remarkable how little appreciated these articles are in a colony that annually imports 70,000 to 80,000 barrels of flour, yet in England plantain meal and the flours of the sweet and bitter cassava were found to make excellent bread and pastry—as food for children and the invalid they cannot be surpassed—and after six months' exposure in the Exhibition buildings their qualities were found unimpaired. To such an extent

could flours and meals from the "roots and fruits" of Guiana be produced, that in the event of the cereals being overtaken by such diseases as have stricken the vine and potatoe, it is not perhaps too much to say that nature has provided in this part of the world the means of mitigating so fearful a dearth.

RICE.—Although no medal was awarded, our specimens were highly commended; and it may not be out of place here to state that rice from Guiana on a former occasion on its first appearance in the London market commanded higher prices than the best Carolina.

This colony is now dependent on a single staple, and that recognised as one of the most fluctuating—yet there is not, perhaps in the world, a country so adapted for the cultivation of rice as British Guiana, seeing that, with a tropical climate, it consists of flat alluvial soil of great fertility with an unlimited supply of fresh water for irrigation. Considering that this grain forms the principal food of certainly one-half of the population of the globe, and that we, at great cost, annually import sixty to seventy thousand bags, the importance of this cereal to us cannot be over estimated. I believe by well regulated action there is ample labour to be had, which, applied to its cultivation, would relieve us of the drain occasioned by its purchase abroad.

CASSAREEP is well known to be the chief ingredient of many of the best sauces, and five to six shillings a bottle is the usual price in London for this condiment. It may not be uninteresting to mention that "pepperpot" was considered about the most successful dish at the Acclimatization Society's great dinner, where luxuries from all parts of the world were introduced.

Judging from the desire in England to obtain good Cayenne pepper, preserves, capsicums, hot pickles, and succades, especially guava jelly, the specimens of which were much approved, I should think some suitable occupation might be found for a class of persons who, incapable of field work, appear to be in a chronic state of want in this colony, namely, unemployed females, seeing that fruit and other ingredients are to be had almost for the gathering, and that sugar is as cheap as in any other part of the world, while our export list shows but a very limited number of small packages of such articles, I would call public attention to a resource only requiring some care and attention to secure a livelihood for a number of persons.

Fibrous substances received six medals and four honourable mentions; the majority of these were awarded to cotton. This colony is so renowned for the produce of this staple, that although for many years we have ceased to export a single bale, "Demerary cotton" remains stereotyped in the Liverpool Prices Current, and occupies a place next to Sea Island. The samples exhibited quite kept up our former repute, and afforded a variety of qualities, from the silky green seed to the coarse qualities of inland obtained from the Macusi Indians. These much resemble what in the trade are called "Bowed Georgias," and are in great demand for general purposes. It is unnecessary to make further remarks about cotton. It is generally known here that we have an unlimited amount of most suitable land for the growth of this plant; in fact, if we had hands, British Guiana alone could supply the demands of the English market. Eleven other fibres were exhibited, every one of which was considered valuable, averaging from £20 to £10 a ton. It is most unfortunate that we have not hitherto been able to utilise the fibre of the plantain, whose fruit may be said to be the staple food of the colony. Thousands of tons of this material are annually allowed to rot on the ground, and yet a very complete and not expensive machine was exhibited, with which the writer with his own hands readily obtained from a banana tree, kindly contributed for the experiment by Sir W. Hooker, from the Royal Gardens at Kew, fibre valued at £40 a ton. Mr. Manifold, Civil Engineer, has all the details of this machine, and is in a position to order it from the patentee. The cost is something under £50.

TO CHEMICAL AND PHARMACEUTICAL ARTICLES five medals and five honourable mentions were awarded. For a colony possessing such extensive territories, consisting, as they do for the greater part, of unexplored tropical forest, this section opens out so vast a field, that it would be impossible in a paper of this sort even to attempt to enumerate the various drugs, resins, gums, dyes, oils, and waxes, that could be obtained from this almost inexhaustible source. Suffice it to say, that Mr. C. Hunter, Surgeon to the Royal Dispensary, Pimlico, under the auspices of that most estimable lady, Miss Burdett Coutts (to whose interest in this colony, as shown by this and other acts, I may here pay a passing tribute), undertook to examine the medical and pharmaceutical contributions, which he describes "as allowed to repose unlooked at, save by a few, in the retired corners of the various courts, if not carefully sought for—not in catalogues, as they were seldom mentioned in them—but in the recesses of the courts." His investigations were chiefly confined to a series of 140 barks contributed by the authorities of British Guiana, but collected by Mr. M'Clintock in the Pomeroun and neighbouring rivers, and said to be in use amongst Indian tribes who inhabit their banks. The result is an interesting pamphlet, which the Committee consider of such value that they have despatched the colonial botanist, Mr. Appun, to obtain larger supplies for further examination. In proof of the utility of the International Exhibition, if such be necessary, I may be allowed to say it determined the value of that new material which, I trust, may ere long be numbered amongst the exports of the colony—I allude to Balata, or juice of the Bullet-tree. This article, combining qualities of caoutchouc and gutta-percha, may possibly be found to supply the great want of the day as a satisfactory insulator, for which purpose there are objections both to India-rubber and gutta-percha. At any rate, it is valued at one shilling and sixpence per pound; and, at this moment, some fifty Indians, who would otherwise be useless to the colony, are obtaining liberal wages to collect it.

OF WOODS FOR BUILDING AND OTHER PURPOSES, we exhibited about 180 different varieties, but as they were shown in collections, only two medals and one honourable mention were awarded. No material is so difficult to bring into general use as new varieties of timber, seeing that the stability and durability of the constructions for which it is used are dependent on the quality employed. Architects therefore naturally hesitate to use untried sorts, while an adequate supply of well-known timber is to be had. Teak from India commands the market. While possessing most of the qualities of our hard wood, it is lighter and easily worked, and contains an essential oil which rather preserves than deteriorates iron. Greenheart is certainly next in rank. In 1861 about a million cubic feet were shipped to the English market; this large supply, combined with other causes, tended to bring down prices, but at the same time introduced it into many new undertakings, so that stocks did not accumulate, and I have no doubt laid the foundation for a continuous demand. Some interesting trials were made by the London and North-Western Company, of greenheart for railway purposes; these were so satisfactory that, having been kindly furnished with copies by Mr. Tinne, of Liverpool, I addressed circulars to most of the railway companies in Great Britain, I trust with some success, as I have learned since my return that some large contracts have been taken up by them. Mora and greenheart are admitted at Lloyd's among the seven or eight woods from all parts of the world recognised as first-class, and they are allowed by this Association to be used in the construction of ships of the "best letter"—mora is little shipped from local causes. No doubt many woods exhibited were of as good a quality as either greenheart or mora, but it takes many years to establish new descriptions in the English markets, and unfortunately local reputation is of little avail. As collections, our woods were much admired, especially those varieties which appeared suitable for furniture; but

among cabinet-makers, as among the more important branches of business, there are recognised woods—such as mahogany, rosewood, and walnut—to which they and their customers are accustomed, and which they will not leave, except especially ordered to do so. Mr. Andrew Hunter exhibited a piece of letterwood which obtained a prize; it was supposed to be the most beautiful specimen at the Exhibition. Captain Fowke, of the Royal Engineers, having undertaken to make a series of experiments on woods from all parts of the world, I furnished him with specimens of most of ours, the results of which, when completed, will be laid before Parliament, and will be distributed in the shape of a Blue Book to the public, and to various countries and colonies whose woods have been contributed. Before leaving England, I ascertained that greenheart retained its high place on the list of the most valuable timbers known.

INDIAN MANUFACTURES AND MISCELLANEOUS ARTICLES.

—The specimens exhibited under this section were more intended for decoration, and as curiosities to illustrate the habits and peculiarities of an interesting, gentle, but waning race, than to compete with the choice fabrics of the civilised world. In their way they attracted considerable attention, and the basket-work from Pomeroy deservedly gained a medal. It is a curious coincidence that the designs of the Pegalls are nearly fac-similes of the patterns as seen on Etruscan tombs and pottery, perhaps the earliest specimens of European art. The Matapis or Cassava squeezer has a description of power, apparently unknown in England; its ingenuity excited some surprise, and several mechanics took a note of these instruments for practical purposes.

NATURAL HISTORY—SEEDS AND IMITATION OF FRUITS.—This section in the Exhibition Catalogue came under Class 29, "Educational Works and Appliances;" although specimens of natural history may scarce be considered legitimate in an industrial and fine art Exhibition, our department would have been deprived of its most attractive characteristics had it not been for the munificent contribution of Mr. Alpin Grant and the collection of butterflies, reptiles, and insects of Dr. Whitlock, Messrs. Erhardt and Appun. These were by far the most popular with the multitude, and rich as our collection was in utilitarian articles our department would often have been left unobserved had it not been for the "Kaleidoscopic" colour of our birds and butterflies—nor are these to be despised in a commercial point of view, as naturalists were very desirous to contract for supplies of birds of brilliant plumage, for the fashion of the day had adopted them as suitable ornaments for ladies and children's hats; emperor butterflies were also in great demand for the evening head dresses of our fair countrywomen. For these insects, and for good skins of the scarlet Ibis (currie currie), five to seven shillings each were freely offered. The natural history contributions of Mr. Grant, Dr. Whitlock, and Messrs. Erhardt and Appun, were rewarded by medals. Mr. Mattis, of Surinam, also received a similar prize for his very clever imitations in a new material of tropical fruits and vegetables.

It will be observed that as our country is principally remarkable for natural productions, only a very few rewards were given for "excellence of workmanship;" amongst these must be reckoned basket-work by the Indians and a table made by Mr. Delph—considering that the furniture class at the International Exhibition was perhaps more replete than any other, it is no small credit to Mr. Delph that in competition with the first manufacturers, he should have obtained an "honourable mention" for the specimen he exhibited.

NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE.

The seventh annual meeting will be held in Edinburgh, commencing Wednesday, 7th October, 1863, and con-

cluding on Wednesday, the 14th October. *President*—The Right Hon. Lord Brougham. *Vice-Presidents*—The Right Hon. the Lord Provost of Edinburgh; the Right Hon. the Lord President of the Court of Session; the Right Hon. the Lord Advocate; Sir David Brewster, F.R.S., L. & E., Principal of the University; Adam Black, Esq., M.P. *General Secretary*—George W. Hastings, Esq. *Local Secretaries*—Professor Archer, F.R.S.E.; Professor Douglas MacLagan, M.D., F.R.S.E.; Alexander S. Kinnear, Esq. Local Office, the City Chambers; General Reception Room, the Parliament House.

The order of proceedings is as follows:—

Wednesday, October 7th, 3 p.m.—Meeting of the Council in the Upper Library of the Society of Writers to the Signet. 8-30 p.m.—General Meeting of Members and Associates in the Free Church Assembly Hall. The Opening Address will be delivered by the Right Hon. Lord Brougham.

Thursday, October 8th, 10-30 a.m.—The President of the First (Jurisprudence) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall. Immediately thereafter the business of the several Departments will commence in the Section Rooms in the Parliament House and Assembly Hall appropriated to their use, when Papers will be read, and discussions taken on the subjects embraced under each. Business of the Departments to close each day at 4 p.m., except when stated otherwise. 8 p.m.—Conversazione in the University, on the invitation of the Principal and Professors. Open to Members and Associates.

Friday, October 9th, 10-30 a.m.—The President of the Second (Education) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will be resumed. 8 p.m.—A Working Men's Meeting will be held, when Lord Brougham and other leading members of the Association will be present. Admission by ticket, price 6d. each; the distribution of tickets to be under the charge of a Committee specially appointed for the purpose. 8 p.m.—The Industrial Museum will be opened for promenade to Members and Associates. 8 p.m.—A Conversazione in the Museum and Hall of the Royal College of Surgeons.

Saturday, October 10th, 10-30 a.m.—The President of the Third (Punishment and Reformation) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will be continued until 2 p.m.

Monday, October 12th, 10-30 a.m.—The President of the Fourth (Public Health) Department will deliver an Address to Members and Associates in the Free Church Assembly Hall, immediately after which the business of the Departments will proceed as before. 8 p.m.—A Conversazione in the National Gallery, on the invitation of H. M. Commissioners of the Board of Trustees for Manufactures, in which the Royal Scottish Academy will co-operate, by making an Exhibition of Scottish Art on the walls of the Royal Scottish Academy Rooms.

Tuesday, October 13th, 10-30 a.m.—The President of the Fifth (Social Economy) Department will Address the Members and Associates in the Free Church Assembly Hall, after which the business of the Department will be continued. 7 p.m.—Members and friends will dine together in the Music-hall, Lord Brougham presiding. Tickets, Gentlemen 10s. 6d., Ladies 7s. 6d., may be obtained in the Reception Room, Parliament House.

Wednesday, October 14th, 12 a.m.—The President of the Sixth (Trade and International Law) Department will Address the Members and Associates in the Free Church Assembly Hall. At 2 p.m. the General Council will meet in the Upper Library of the Writers to the Signet, and at 8 p.m. the concluding General Meeting will be held in the Assembly Hall, High-street.

GOLD IN THE HUDSON'S BAY TERRITORIES.

(From the *Toronto Globe*, 28th July, 1863.)

We have to communicate to our readers to-day intelligence which, if fully established by further examination and inquiry, will add new life to the zeal of the Nor'-Western adventurers, and hasten the opening up of the territory at a rate which will outrun the anticipations of the most sanguine. For some time it has been known that gold was to be found on the Saskatchewan River, near the Rocky Mountains, and it was presumed that it had been washed by the river from the gold-bearing rocks of these mountains, and would consequently be found only in the beds of the rivers, and not elsewhere in the territory. Recent discoveries indicate that this view of the matter is not correct, and that in order to find the gold of the North-West, it will not be necessary to traverse the whole breadth of the great plains to the head waters of the Saskatchewan. Gold has been discovered at Fort Ellice on the Assiniboine, and also on the branches of the Qu'Appelle River, streams which unite and run into the Red River, and have no connection with the Rocky Mountain range. Of this fact there can be no doubt. It is not only communicated by letter from Red River, but Governor Dallas, of the Hudson's Bay Company, who has recently arrived from the territory, is personally cognisant of the discovery. The question arises: From whence comes this gold?—where lie the rocks from which it has been displaced? Professor Hind, of this city, who explored the country for our Government in 1858, supplies an answer. He says, in his report, that he discovered in St. Martin's Lake, a small sheet of water lying between Lakes Wanitoba and Winnipeg, gneissoid rocks, traversed by quartz and felspathic veins, and that these being gold-bearing rocks he searched for it, but nothing was found, probably owing to the lack of time. The deduction which he now draws from the discovery of gold on the plains of the Assiniboine is, that the precious metal has been conveyed with the drift from ranges of gold-bearing rocks, running parallel with the Lake Winnipeg basin, and the Laurentian formation on the eastern side of the lake and extending to the North-West beyond Lake Arthabasca. He considers it certain that all over the drift of the plains, from Lake Manitoba to the Rocky Mountains, gold will be found, though, as a matter of course, the wideness of the field can only be ascertained by actual mining operations.

We understand that Governor Dallas washed gold with his own hands at Fort Edmonton on the Saskatchewan, and, in further proof of the existence of the precious metal, we may add that large numbers of the Selkirk people have gone west to enter upon regular mining operations. We see no reason to doubt that the whole of these vast plains will very soon be covered by a busy population. The means of communication alone are wanting, and we are happy to learn that the new Hudson's Bay Company contemplates a very speedy opening up of the territory. It is hoped that steamboats will be running on the Saskatchewan within a year from the present date. The plans of the company contemplate also, in spite of their prospectus, the immediate assumption by the Crown of the whole region lying between Lake Winnipeg and the Rocky Mountains, south of Lake and River Arthabasca, with the exception of such portion (reported to be every alternate section) as will be devoted to repay the Company for opening the communication by common roads, and steamers on the rivers from Lake Superior to the Rocky Mountains, and afterwards by a railway, which, it is hoped, will be finished within ten years. Further explanations of the plans for the government of the country and other matters will doubtless be speedily afforded to the Government, and duly weighed by them. The prospect of the realisation of our long-indulged hopes of the opening up of the territory seems, however, to be very favourable.

We have received the Red River *Nor'-Wester* of June 30 and July 15. They contain but little of general

news, but the following with regard to the gold fields and farming prospects of the Saskatchewan is of interest:—

(From the *Nor'-Wester*, June 30.)

We have received a letter from Mr. George Flett, dated Saskatchewan, 10th May, 1863, from which we make the following extracts:—

"I have written to you many letters, and I know that you have not received all of them. One, sending for some supplies, was sent back from Carlton. Letters to me are not, I imagine, forwarded very regularly either; for I have only received four in all since I came here, and none at all during the winter, although Mr. H. McBeath and others to whom letters have been written have received them three times this winter.

"The past winter was a very mild one. There was so little snow that we had only one month of good hauling. On the 9th of April we left our comfortable winter house to go to Mud Fort, about fifty-five miles above Edmonton by land, and between seventy and eighty by water. We reached our destination on the 15th, and on the 23rd we set our rockers under way. Not having any quicksilver we cannot tell you exactly the amount we make per day per man; but Mr. Love and Mr. Atkinson, old miners, are satisfied that we make from 8s. to 10s. per day.

"Gold is to be found in almost every point or bar, to pay from 6s to 8s. per day, and before next Fall you will hear good news from the Saskatchewan mines. News from Peace River and other places near the mountains on this side is very cheering. Five hundred miners from the west have crossed the mountains to mine on this side, and those at Peace River are represented to have found gold in great quantities, but they are badly off for provisions. Flour is 1 dol. 50 cents per lb., and everything else in proportion. One hundred of these miners propose to come here this summer for provisions, and if they cannot get enough they are going to Red River for their supplies.

"George Gunn and myself left the miners for some time to farm. We put down nine bushels of wheat and barley, and after our horses and oxen rest a few days, we are going to plough with two ploughs for a month. We know that if we have grain or flour the gold will come to us. As in all new gold districts, there are here too many gold-seekers for the number of provision gatherers.

"In richness of soil this country cannot be beaten. Indeed there is every encouragement in the soil, climate, and demand for agricultural products to induce settlers to come here. For trading even among the Indians, flour is better than goods, and the parties who raise it here would, of course, save freight, while they realised the highest prices going—which are high enough in all conscience. If a good millwright were to come to this place, and bring a pair of millstones and the necessary iron, he would do a great business by running a mill. There are several people who propose going to Red River for ploughs, who intend to commence farming on their return. Mill streams with good stone bottoms are, I may mention, plenty. There is a great demand for cows.

"As an instance of the profit of farming, I would state that I saw a man coming home from the plains with several horse trains, loaded with pounded meat and grease that he bought from the Crees in barter, for little or nothing. Two bushels of potatoes sold to the Indians will load a horse sled; for one turnip you will get a bladder of grease; for ten quarts of good flour you will get 100 lb. of provisions; and you can get buffalo robes and furs generally for flour, at similarly cheap rates—cheaper than for goods."

(From the *Nor'-Wester*—editorial—July 15.)

That gold existed in paying quantities of the eastern as well as the western slopes of the Rocky Mountains, was, until 1861, pretty much a mere theory. The probability was that the opinion was correct; but up to that time no practised miner had sought for the precious metal on this side.

At length the welcome intelligence of the Saskatchewan mines broke in upon us, and we were told that gold would pay for the digging, even as far down the river as Edmonton. Subsequently we had the most reliable intelligence confirming this good news, with the addition that diggings at Edmonton had paid five dollars per diem with the rocker.

This intelligence so wrought upon our own community and upon the people of Canada that a considerable number of fortune-seekers left this for the mines the following spring. The great body of these were, it is well known, Canadians, who came hither so much under the inspiration of the London *Times* correspondent's letters respecting Cariboo, that they had no patience to linger on the road testing other mines. Five dollars a day was a very slow old-fashioned rate of money-making to those whose imaginations were excited with glowing pictures of "the largest gold field in the world;" and most of them having determined to go where wonderful discoveries had just been made, they crossed the mountains.

Our people resisted the allurements of the Cariboo region, and remained among the prospectors on this side, being convinced that the diggings were, at least, worth a trial. The result is worthy of record. With but little mining experience—only two or three being regular miners—and withal so few in numbers that the prospecting was necessarily confined to a very limited area—these pioneer miners must be regarded as having been very successful.

Most of the rivers that have been examined—the Peace River, Saskatchewan, Clearwater, and others—have proved to be auriferous even with the most hasty, superficial testing; and miners whose experience has been gathered in California and elsewhere express themselves quite satisfied with the prospects of rich yields, while even novices assert that under all the circumstances they are better off than they were here.

We have lately had information from the vicinity of Edmonton to the effect that in three days four men washed out £80 sterling worth of gold dust. And from other quarters we have received reliable accounts of a very cheering nature. The gold-fields—although worked for the most part, as we have said, by inexperienced hands, have turned out far better than we expected. Such had been the richness of the Peace River diggings indeed, that, at last accounts, hundreds of miners from the western side had been attracted to them. Large numbers had also recently arrived at the mines on the Missouri, and were working them with wonderful results. Altogether, the mines on this side are proving so lucrative as to attract very general attention; and we hope that before long they will be thoroughly tested.

It must be borne in mind that, after all, the great importance of the recent discoveries on the Saskatchewan and other rivers lies in the indication they give of larger and richer deposits. On hearing of these discoveries, Dr. Hector, who accompanied the Palliser exploring expedition, gave it as his opinion that the gold deposits had been washed from the shingle-terraces along the eastern base of the mountains, where, it is believed, the precious metal will be found in the greatest abundance. The geologist and the miner alike point to them as the sources of the richest deposits.

As if still further to stimulate the progress of gold-hunting in Rupert's Land, we have had renewed and repeated assurances of the great agricultural capabilities of the valley of the Saskatchewan. Blessed with a fertile soil and genial climate, it is a region which holds out rare inducements to the farmer. On its plains he can raise produce cheaply, and nowhere else can he dispose of it at such an enormous profit.

With flour at 7 dollars the hundredweight, and every other agricultural product at a proportionately remunerative rate, it must be admitted that to the farmer as well as to the gold hunter this magnificent region is really a land of promise.

BRITISH ASSOCIATION, NEWCASTLE-UPON-TYNE, 1863.

ON THE CONSTRUCTION OF IRON SHIPS, AND THE PROGRESS OF IRON SHIPBUILDING ON THE TYNE, WEAR, AND TEES. BY C. A. PALMER.

The paper which I have the honour to bring under your notice to-day is limited to a brief explanation of the general principle upon which iron ships are constructed, and a short statement respecting the progress of iron shipbuilding on the Tyne, Wear, and Tees.

The art of constructing ships dates from remote antiquity, and we find in history, sacred and profane, many particulars of the ships in use in ancient times. As civilisation advanced, and the science of navigation became better understood, ships increased in size, strength, capacity, and speed. Year after year brought its improvements, century after century its changes, until the art of shipbuilding in wood approached perfection, and the rude coracles and row galleys of our forefathers had given place to the clipper ship, with its fine lines, tapering masts, and flowing canvass—the merchantman driven by steam at a high speed across the ocean, and the three-decked steam-propelled man-of-war. Then a demand arose for vessels of a still higher character—merchantmen possessing still greater speed, men of war sufficiently powerful to resist the destructive shot and shell which the genius of men, like our friend and townsman, the President of the Association, were inventing. With wood as the material to be employed, this demand could not be met; but human skill was equal to the emergency. The important discovery was made that "ships built of iron float lighter, strength for strength, than ships built of wood;" and, although for many years the prejudices of some men, and the interests of others, prevented the general adoption of the principle, it eventually triumphed, and now iron is rapidly superseding wood as a material of which ships are constructed.

The principal advantages that are claimed for ships of iron, as compared with vessels of timber, are briefly these:—

In vessels of 1,000 tons the iron ship will weigh 35 per cent. less than the timber vessel, the displacement of water being the same. The iron ship will, therefore, carry more weight, and as the sides are only about one-half of the thickness, there will, consequently, be more space for cargo. The additional strength obtainable, too, allows iron ships to be built much longer and with finer lines, thus ensuring higher sailing or steaming qualities, with greater carrying power, and therefore greater commercial results. In wooden vessels repairs of ruinous extent are frequently required, while the repairs in iron ships are generally of a lighter character, and are only needed at long intervals. An iron ship is not liable to strain in a heavy sea, whereas the straining of a timber vessel often damages a valuable cargo. The bilges of an iron ship can be kept clean and free from the disease-engendering bilge water which is always found in a wooden ship. Moreover, the use of iron masts, steel yards, and wire rigging, effects a very large saving of weight, and affords the greatest facilities for the application of patent reefing sails and other appliances, by which economy of labour is attained, and many risks of loss of human life avoided.

As to the form of building iron ships, and the manner of combining the iron so as to obtain the requisite amount of strength with the least amount of material, much difference of opinion exists among practical men. The angle iron frame and plating of the iron vessel take respectively the places of the timbers and planking of the wooden ship; and it has been found by experience that plating $\frac{1}{4}$ th of an inch thick is equivalent in effect to planking of oak one inch thick, whilst plating $\frac{11}{16}$ ths of an inch thick is equal to planking of oak five inches thick. As in the largest American wooden vessels, the plank is seldom more than five inches thick, so it may be argued on the above data that the plating of the largest iron ship need not be more than $\frac{11}{16}$ ths thick; and, that any

strength required above that which such plating would give should be obtained by means of framework. Many practical men, however, advocate the system of light framework, and, in order to obtain the measure of strength necessary, the application of thicker plates. That the principle of strong framing and plating of moderate thickness is most advantageous may be shown by many facts other than those which are derived from the most modern practice of wood shipbuilding. The strength of an iron ship, as in a girder, depends on its capability to resist the buckling and tensile strains that it is called on to bear. But I believe that we have, in reality, only to make a ship strong enough to resist the buckling strain; and I am led to this conclusion by experiments conducted for that celebrated work, the Britannia-bridge, which proved that, in constructions of wrought-iron, the resistance to the tensile strain is much greater than their resistance to buckle, and, in consequence, the upper part of the girders are made much stronger than the lower part. We have, in my opinion, to make the parts of an iron ship, in principle, like a girder. A girder, however, is at rest, and the strains are always in some known direction; but in a ship whose position is ever varying, it requires to be so constructed as to resist the strains in such varied positions. If the side of a ship could remain, as in a girder, constantly vertical, then the advocates for the thick plates and small frames might be able to show that their system was the most economical way to obtain the requisite strength, but as such side, if laid over, as it is in a ship at sea, would, without support, bend or buckle of its own weight, it is evident that the framing is absolutely necessary to keep the plating firm in position, and consequently the strength of the ship depends in a very great degree on the strength of the framing. Another fact that shows the economy of strong frames, is that a plate with a piece of angle iron attached to its edge, would bear much more before buckling than a similar plate increased in thickness so as to weigh the same as the plate and angle iron. But the great and most important argument in favour of moderately thick plates and strong framing is, that all the work must be put together by hand; for though many attempts have been made to rivet ships by machinery, none seem yet to have been successful even in a mechanical point of view. So soon, therefore, as the thickness of plates and the size of the rivets pass the point at which the workmen with ordinary exertion can accomplish good work, then the attachment of the parts by means of rivetting is subject to the risks of imperfect workmanship. It is, therefore, my opinion, both in a practical and theoretical point of view, that we ought not to use plating in any vessel, however large, more than about $\frac{3}{4}$ of an inch thick.

In the early period of iron shipbuilding, the frames were generally composed of simple bars of angle iron, but they are now usually doubled by a reverse bar, which is rivetted on the principal bar, so as to make a frame, whose cross section is like the letter Z, and this form is perhaps as strong as any that could with economy be obtained. In some large ships plates of iron on edge were placed between the angle irons, so as to enlarge the section. The frame thus formed required longitudinal supports to bind it together, and those all-important strengthening pieces, called stringers, box and other keelsons were introduced. The great advantage of these appliances is that they may be placed exactly where the ship requires support, and that, too, with the least possible amount of iron. As to the application of these stringers and keelsons, the ship-builder must be guided by the form, proportions, and other circumstances connected with the construction of the ship.

To show how far this system of longitudinal framing may be carried with success, I may point to the ship *Richard Cobden*, designed by Mr. Guppy (known in connection with the construction of the *Great Britain*), in 1844. This vessel was framed so as to leave rectangular spaces to be covered with the outside plating; these

spaces were 2 $\frac{1}{2}$ feet vertically, and 5 and 6 feet horizontally, and in no part of this highly successful construction were the plates more than $\frac{3}{4}$ inch thick.

As to the riveting, which is of the utmost importance in shipbuilding, I shall say a few words. In making boilers, single riveting is usually adopted, but there the strain is constantly in one direction. In ships, the direction of the strain is changeable as the vessel moves, therefore double, and in some cases triple, riveting has been used with great advantage.

Mr. Fairbairn estimates that the tensile effect of single riveting is represented by 56, double riveting by 70, and triple riveting by 90, and these proportions would appear to hold good, whether in chain or zig-zag riveting. The former, however, has been shown by experiment to have an advantage over the latter of about 20 per cent. in the tensile strain.

In concluding this necessarily brief account of the general principle on which iron ships are constructed, I may mention that the only objections that can reasonably be urged against ships made of this material are, that the compasses are difficult of adjustment, and that the bottoms get foul. Let us, however, hope that science, in the promotion of which the British Association is so powerful an agent, may in a short time shew us how both these difficulties may be overcome.

I now proceed to what is, perhaps, the more interesting division of this paper, viz., a sketch of the progress of iron shipbuilding on the Tyne, Wear, and Tees.

For a very long period the district of the Tyne, Wear, and Tees, has been famous for its shipping. A committee of the House of Commons, that sat so far back as the year 1642, designated Newcastle as "the nursery for shipping," and Defoe, writing of the Tyne in 1727, states that "they build ships here to perfection—I mean as to strength and firmness, and to bear the sea."

The history of iron shipbuilding in this district does not commence, however, until the year 1840. In March of that year, the *John Garrow*, of Liverpool, a vessel of 800 tons burthen, the first iron ship seen in these rivers, arrived at Shields, and caused considerable excitement. A shipbuilding firm at Walker commenced to use the new material almost immediately, and on the 23rd of September, 1842, the iron steamer *Prince Albert* glided from Walker slipway into the waters of the Tyne.

During the next eight or ten years very little progress was made. The vessels mostly in demand were colliers, and no one thought of applying iron in their construction. But, about the year 1850, the carriage of coals by railway began seriously to affect the sale of north country coal in the London market, and it became essential, in the interest of the coal owners and others, to devise some means of conveying the staple produce of this district to London in an expeditious, regular, and, at the same time, economical manner. To accomplish this object, I caused an iron screw steamer to be designed in such a manner as to secure the greatest possible capacity, with engines only sufficiently powerful to secure her making her voyages with regularity. This vessel (the *John Bowes*), the first screw collier, was built to carry 650 tons, and to steam about nine miles an hour. To the success of this experiment may be attributable, in a great measure, the present important development of iron shipbuilding in this district, and the fact that we continue to supply so largely the London market with coals. On her first voyage, the *John Bowes* was laden with 650 tons of coals in four hours; in forty-eight hours she arrived in London; in twenty-four hours she discharged her cargo; and in forty-eight hours more she was again in the Tyne; so that, in five days she performed successfully an amount of work that would have taken two average-sized sailing colliers upwards of a month to accomplish.

The amount of prejudice with which nautical men, and persons engaged in the shipping and coal trades, opposed the introduction of screw colliers was great. They argued that it would be impossible for steamers carrying 650 tons

of coals, and costing about £10,000, to compete with vessels that consumed no fuel, and which, though carrying only half the quantity, cost little more than £1,000, or only one-tenth the amount. I was, however, confident of the result, and persisted in the development of the system. How far my views have proved correct will be borne out by the following table, which shows the number of cargoes and tons of coals imported into London by screw steamers in each year, from July 31, 1852 (the date of entry of the first screw steamer, *John Bowes*), to June 30, 1863:—

Year.	Cargoes.	Tons.
1852	17 making	9,483
3	123	69,934
4	345	199,974
5 ... Crimean War	174	85,584
6	413	238,597
7	977	547,099
8	1,127	599,527
9 ... Italian War	899	544,614
1860	1,069	672,476
1	1,299	851,991
2	1,427	929,825
3 Half-year ending June	714	463,609

5,212,713

By this table it is seen that a total quantity of 5,212,713 tons of coals have been imported into London, by screw colliers, and, in addition to this, large and increasing quantities have been taken to other ports both in this country and abroad. Since its first introduction, too, the screw collier has been greatly improved, and the facilities for loading and discharging very largely augmented. The screw collier *James Dixon* frequently receives 1,200 tons of coals in four hours, makes her passage to London in thirty-two hours; there, by means of the hydraulic machinery which our President invented, amongst the other inventions which distinguish his name, discharges her cargo in ten hours, returns in thirty-two hours, and thus completes her voyage in seventy-six hours. The *James Dixon* made fifty-seven voyages to London in one year, and in that year delivered 62,842 tons of coals, and this with a crew of only twenty-one persons. To accomplish this work on the old system, with sailing colliers, would have required sixteen ships, and one hundred and forty-four hands to man them.

One of the great difficulties we had to encounter in perfecting these vessels was in the ballasting. To dispense with the necessity of shipping shingle or chalk as ballast, many costly experiments were tried, and at length, by a system of double bottoms, the construction of which adds to the strength of the ships, the ballasting of the vessels with water was brought to a highly satisfactory result. The water is allowed to run into the spaces between the two shells as the vessels pass down the Thames; when the spaces are full the cocks are closed and so remain until the arrival in the Tyne, when the water is pumped out by means of an apparatus provided by the purpose. This system allows the vessel to be ballasted without loss of time at either end of the voyage; and does not impair in the slightest degree her power of carrying coals. The introduction of the screw collier has revolutionised the coal carrying trade, and has had a most beneficial effect upon commerce generally. Besides accomplishing the purpose for which it was designed, this class of vessel has been proved capable of rendering very important services to the Royal Navy. When in the latter part of the year 1854 information reached this country that the commissariat department of our army in the Crimea had broken down, and that the salvation of our troops depended upon a rapid despatch of supplies, it was found that screw colliers were admirably adapted for the work, and the majority of them were temporarily taken out of the coal trade and employed in the transport service. The Government admitted, on that occasion, that screw colliers had proved to be more useful and economical than any other class of vessels they had employed.

In the year following the launch of the *John Bowes*, namely, in 1853, the first iron vessel built on the Wear was loosed from its blocks. The *Tees* followed with great energy and considerable success, and on both those rivers, as we shall see presently, a very considerable trade in iron shipbuilding is carried on.

The first iron vessel, for war purposes, constructed in this district, was *The Terror*, one of the large iron-cased floating batteries designed, during the Russian war, to operate against Cronstadt. This vessel, of 2,000 tons, 250 horse power, carrying 26 sixty-eight pounder guns, was built in three and a half months, and she would have been completed in three months had not the declaration of peace slackened the energies of our men, which, up to that time, had been maintained so nobly by their patriotic feelings.

It was in the building of this vessel that rolled armour plates were first used. The demand for forged armour plates was so great that the forges of the kingdom could not supply it, and recourse to rolling was unavoidable. At that time the largest plate mill was at Parkgate, and we accordingly employed Messrs. Beale and Co., the owners of Parkgate works, to roll the plates we required. To the use of these rolled plates, however, the Admiralty opposed itself, but we feeling convinced, by experiments which we made, that the rolled armour plates were, at least, equal to the forged, invited the Admiralty to a trial of their efficiency.

We built a target nine feet square, on a plan which we thought might be advantageously adopted for large vessels of war, and on the cellular principle. The cells we filled with compressed cotton, which we had found by experiment to be very effectual in stopping shot. On this target was a thin teak backing, on the teak were bolted one hammered and two rolled plates. The target was bolted on to the side of an old wooden frigate at Portsmouth, under the direction of Captain Hewlett. The first shot fired at it missed the target, went through both sides of the frigate, and, to my great astonishment, skimmed over the surface of the water for nearly a mile. The firing showed that whilst the hammered plate split and cracked to pieces, the rolled plates were not broken, only indented, and were superior to the hammered plate in every respect. Unfortunately the target was not firmly bolted to the vessel, and it sprung at each shot, so that the bolts which held the armour plates were broken, and they fell into the sea.

A shot was then tried to test the resisting power of the compressed cotton, and it appeared to answer so well that Captain Hewlett advised a series of experiments to be tried. The Admiralty were willing, but required us to provide the target at our own expense. Having already spent upwards of £1,000 on experiments for the good of the country, we declined this proposal; nevertheless, we had proved to the Admiralty this important fact, that the rolled plates were superior to the forged, and they have since been universally adopted. We claim, therefore, for this district, the honour of being the first to prove the strength and utility of rolled armour plates, since known and spoken of in Parliament as "*Palmer's Rolled Plates*."

While on this subject of armour plates, I may, perhaps, be allowed, as the builder of the iron-plated frigate *Defence*, to make a slight digression in order to express an opinion upon the class of marine architecture to which that vessel belongs. The *Defence*, although in every respect a strong ship, does not combine all the strength which, with the same weight of material, might have been obtained; and with respect to her model, it is my opinion that if she had less rise, and more floor, and so had drawn less water, she would have steamed faster, answered the helm quicker, and have proved in all respects more manageable and convenient. The Admiralty authorities, I know, do not agree in this view, and they are at the present moment spending a large amount of money in the national dockyards, for the express purpose of building a class of vessels similar in construction. In my opinion it

is, to say the least, very questionable policy for the Admiralty to speculate in this kind of shipbuilding. Private builders exerted themselves greatly in the production of armour-plated frigates for the Government; these vessels were produced in much less time than would have been consumed in the Naval dockyard, and in the matter of cost the difference must be greatly in favour of vessels built by contract. It is surprising to see the tenacity with which the Admiralty cling to wooden ships, notwithstanding the most overwhelming proofs that it is time to adopt iron exclusively.

It was my desire to furnish the Association with accurate statistical details of the iron shipbuilding trade of these northern rivers, showing the quantity of iron consumed, the number of men directly employed, and the amount of tonnage launched per annum. But unfortunately, my neighbours here, and on the Wear and Tees, with a few exceptions, were too much engaged to supply me with the statistics of their respective establishments; I have, therefore, estimated the several totals from such materials, aided by personal knowledge and experience, as I was able to obtain, and the following statement will, I think, be a pretty close approximation to accuracy:—

	Tons.
Estimated amount of tonnage of iron ships launched on the Tyne during the year 1862	32,175
Do. on the Wear.....	15,608
Do. on the Tees	9,660
	<hr/> 57,443

The number of men annually employed in producing this quantity of tonnage, exclusive of those engaged in the manufacture of engines was—

	Men.
On the Tyne	4,060
„ Wear	2,500
„ Tees	1,550
Total.....	<hr/> 8,110

The quantity of iron consumed during the same period, in the construction of iron ships, was—

	Tons.
On the Tyne	22,540
„ Wear	9,860
„ Tees	6,760
Total.....	<hr/> 38,660

The amount of iron tonnage at present on the stocks in this district is as follows:—

	Tons.
On the Tyne	33,000
„ Wear	19,000
„ Tees	10,600
Total.....	<hr/> 62,600

But these statistics show us only the labour that is directly employed in the production of iron ships, and that, as we all know, is but a small proportion of the whole. It would indeed be difficult accurately to estimate the amount of labour that is indirectly concerned in this trade, as, for instance, in the manufacture of iron, the production of coals, the importation of timber, the construction of engines, and the supply of anchors, chains, sails, &c., &c. Enough has been said, however, to prove that iron shipbuilding is one of the most important branches of industry in this great commercial and manufacturing district.

I may perhaps be allowed to describe very briefly the operations of my own firm, which, I trust, will prove of some interest, as showing the extent to which one establishment may be developed. In the first place, we obtain the greater portion of our iron stone from our own mines. At a point on the coast ten miles north of Whitby, the ironstone seams crop out in the sides of the

cliffs, and here we have formed the small harbour of Port Mulgrave, where vessels can ride in safety, and ship their cargoes with ease and expedition. Between the Tyne and Port Mulgrave, some of our steamers run direct, making on the average four voyages per week, whilst others of a larger class call to load stone on their return voyage from London. At Jarrow, the ore is delivered to the furnaces by means of the Armstrong hydraulic cranes, and mixed with ores from Cumberland, Devonshire, and Lincolnshire, thence it is passed to the mills, and from the mills to the ship-yards. The number of men employed in these operations is upwards of 3,500. The number of tons of iron consumed per annum in our yards and engine-works is about 18,000 tons. The amount of tonnage launched during the year ending the 1st August was 22,000 tons. We have 15,000 tons in course of construction, and orders spread over a period for 40,000 tons more. Amongst these latter are steamers of upwards of 3,400 tons burthen, pronounced by their owners to be “the finest and most complete merchant steamers ever built.” They are intended to bring cotton from the Southern States of America, so soon as the unhappy war in that country shall cease, and they will no doubt be but the pioneers of others of a similar class. One of these steamers is of sufficient capacity to carry 7,000 bales of cotton, and it is estimated that, during one year, she will bring from New Orleans to Liverpool 38,000 bales. The crew of such a vessel consists of sixty hands, and it would require five sailing vessels of 1,200 tons each, employing 130 seamen, to do the same work.

A consideration of the future of the iron shipbuilding trade opens out a vast field for speculation; but the ultimate result is not difficult to anticipate. We have seen with what success sailing vessels have been superseded by steamers in the coasting and coal trades, and we know that magnificent fleets of steamers, engaged in the postal and other services, are ploughing almost every known sea. As commerce increases, there will be few trades in which the employment of iron steamers will not be found of advantage. Most of the carrying trade to the Baltic and Mediterranean is already conducted in vessels of that class, and the sailing ships that cross the North Atlantic are being rapidly displaced by iron steamers. Their advantages in strength, speed, and capacity, are so marked, that sailing vessels of timber must give way before them. Even the Admiralty, cautious and unyielding though it be, will have to abandon its “wooden walls” in favour of the stronger and more useful material; a material, too, that lies in rich profusion beneath our feet, and has not, like timber, to be purchased of other nations. The commercial men of this country have set the Admiralty a signal example of industry and enterprise. It is they who have made the experiments and adopted the inventions that have established the maritime supremacy of this country; and it is owing to their energy that we find on every sea, in the shallow rivers of the east, and the deep broad waters of the west, English-built ships of commerce diffusing the benefits of free-trade, and linking nations and tribes together in the bonds of amity and peace. The true source of our national greatness is to be sought in this wonderful development of our merchant navy. Other nations are entering into friendly rivalry with us, but the larger share of the carrying trade of the world will ever be secured to that country that can produce vessels combining the largest capacity with the utmost amount of economy and expedition in construction, and that can, at the same time, navigate those vessels with the greatest degree of skill and rapidity.

In conclusion, permit me to express the proud conviction I entertain that the mineral wealth of this district, and the skill and endurance of its workmen, whether on land or sea, will enable the locality that gave birth to an Armstrong and a Stephenson to maintain its character for maritime industry and enterprise, and to bear its full share in promoting the commercial greatness of the country.

ON THE APPLICATION OF MACHINERY TO COAL CUTTING.

By SAMUEL FIRTH.

Numerous efforts have been made, during the last 50 years, to bring coal cutting in mines under the influence of mechanical power, but in no case, I believe, except at the West Ardsley Colliery, has any continuous operation survived the experimental period.

I do not expect that the introduction of machinery into coal mines for the purposes named, would materially diminish the number of persons employed, but rather that the effect would be to meet the increasing consumption. That increase may safely be taken at two millions of tons per annum, and to supply this increase would require an annual increase of labourers amounting to about 3,500. Thus there will not be any displacement of labour.

The steam engine has a 20-inch cylinder, and the air-pump 18 in. The air is worked at a pressure of about 50 lbs. to the square inch. The air is conducted down the shaft in iron pipes of 4 inches diameter, and thence to the workings (about 800 yards) in gas piping, and down the face by India-rubber piping of one inch diameter, which is connected to the machine. The machine is moved on iron rails laid on cross iron sleepers, and is propelled a little, after each blow of the pick, by the hand-wheel. Generally, the machine is passed three times over the face of the coal, each time with a longer pick, to gain the requisite depth for taking down. The first cut being 18 to 20 inches, the second 9 to 11 inches, and the third from 6 to 8 inches; 36 inches being the depth aimed at and accomplished. The actual quantity of work done in six consecutive days of eight hours each, by one man with one machine, was 618½ yards, or about 800 tons of coal. The man is attended by two boys, who clean out the groove, and remove the coal thrown out by the machine. In the West Ardsley seam a man will average 7½ yards of coal a day, so that if the machine were worked by shifts of eight hours, three men and six boys would do the work of forty men, and that, too, the most severe and trying work in the pit.

It must be understood that at West Ardsley the seam is somewhat favourable for the purpose. It is 4ft. thick, having a good roof and floor, and is worked on the long-wall system, with a somewhat soft bareing part, about 12in. above the floor, and in this the pick works. The comparison, however, with hand-work, is fairly made, because both work in the same part of the seam. The machine thus far has only been put to "bareing," or "kirving," but the proprietors expect to effect "straight-work" by a different arrangement of the picks. The filling, and all other work of the pit, is untouched by this machinery. The air-power works admirably; and its use gives a cool and refreshing stream of pure air to the far-distant works, which issues from the cylinder at a temperature very little above freezing point. It will not be necessary to say here that the air-power is acquired by a much larger measure of steam power; but this is not a material item at a colliery, where so much engine coal is almost worthless. I am not prepared with the exact commercial results or saving in cost, but at West Ardsley this part of the question is, I believe, eminently satisfactory. I have been informed that some experiments have been made, within the last few days, at the Hetton colliery, by the West Ardsley machine; and although the seam is of a hard nature, the kirving was done three feet deep with a groove of three inches at the face and two inches at the back, giving an average cut of 2½ inches high; whereas the average height of hand-kirving in the same seam is about 11 inches.

This saving of good coal from destruction is equal to an average of ninepence per ton upon the whole yield of the seam.

Another machine of a different principle has been invented at West Ardsley, and promises to be a most useful one. It is on the direct-action principle, with a to-and-fro motion, from a cylinder mounted transversely upon

the carriage, and regulated in a similar manner to the pick machine.

This invention has not advanced so far as the "pick," but some recent experiments have given most satisfactory results. The complete success of this machine will be of great importance, as it will be more effective in "straight work," "headings," and "drilling," than the pick.

In conclusion, I may express the confident opinion that, at no distant period, every branch of mining will be accomplished by machinery; and if we look at those results from a humane point of view, the sooner they are realised the better it will be for all parties, and especially for the working collier.

EXAMINATION PAPERS, 1863.

(Continued from page 685.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May:—

FRENCH.

THREE HOURS ALLOWED.

PART I.

Candidates for a Third-class Certificate are to translate the following extract into English, and to answer the grammatical questions thereto annexed (in the order in which they are placed). The first part is all that is required of them.

Nous manquons essentiellement de la vertu civique avec laquelle les hommes des anciens jours rendaient service à la patrie au dernier rang. La maladie de notre temps est la Supériorité: il y a plus de saints que de niches. Voici pourquoi: avec la monarchie s'en est allé l'honneur; avec la Religion de nos pères, la vertu chrétienne; avec nos infructueux essais de gouvernement, le patriotisme; du moins, ces principes-là n'existent plus que partiellement au lieu d'animer les masses; car les idées ne périssent jamais. Maintenant nous n'avons plus pour étayer l'ordre social d'autre soutien que l'égoïsme. Les individus croient en eux; l'avenir, c'est l'homme social; nous ne voyons rien au-delà. Le grand homme qui nous sauvera du naufrage vers lequel nous courons, se servira sans doute de ce ressort pour nous refaire nation; mais en attendant cette régénération, nous sommes dans le siècle des intérêts matériels et du positif. Ce dernier mot est celui de tout le monde. Nous sommes tous chiffrés, non d'après ce que nous valons, mais d'après ce que nous pesons. Aussi l'homme d'énergie obtient-il à peine un regard, s'il est en veste. Ce sentiment a passé dans le gouvernement. Le ministre envoie une médaille d'argent au marin qui sauve au péril de ses jours une douzaine d'hommes, et donne la croix d'honneur au député qui lui vend sa voix.—BALZAC.

1. Parse the first two sentences of the above extract (down to "niches").

2. Give in distinct lines the five primitive tenses of each of the following verbs:—*S'en est allé, croient, voyons, courons, se servira, valons, obtient.*

3. Put the article and a suitable epithet before each of the following nouns, so as to show its gender:—*Fatte, parterre, rhume, brume, lierre, adage, parachâte, parafé, épices, cortège, trapèze, enclume, légume, cloison, laboratoire, poix, chaux, platine.*

4. Give the substantive which corresponds to each of these adjectives:—*Civique, ancien, saint, social, grand, matériel*; and also the adjective which corresponds to each of these nouns:—*Vertu, homme, supériorité, monarchie, religion, patriotisme, idée, égoïsme, intérêt, péril.*

5. Give the nouns and adjectives that correspond to *essentiellement* and *partiellement*, and state how a French adverb is formed.

6. Explain why, in the last sentence but two of the extract, the nominative case comes after the verb, viz.,

"obtient-il," as though the question were interrogative, which is not the case. Can you give other instances of a similar construction?

7. State the difference there is between *du moins* (7th line) and *au moins*.

8. What is the meaning and use of the particles *ci* and *là* in: "cet homme-ci," "ces principes-là?"

9. Explain the particle *ne* in every one of the following different sentences:—

"On se voit d'un autre oeil qu'on *ne* voit son prochain."

—LA FONTAINE.

"Car que faire en un gîte, à moins que l'on *ne* songe?"

—LA FONTAINE.

"Gardez qu'une voyelle à courir trop hâtée,
Ne soit d'une voyelle en son chemin heurtée."

BOILEAU.

"Je tremble qu'Athalie * * * * *
N'achève enfin sur vous ses vengeances funestes,
Et d'un respect forcé *ne* dépouille les restes."

RACINE.

"Depuis l'invention de la poudre, les batailles sont moins sanglantes qu'elles *ne* l'étaient."—MONTESQUIEU.

10. Show with examples when *will*, *would*, *should*, *may*, and *might*, must be considered as mere auxiliaries of the verb which they precede, and when, on the contrary, they are separate verbs to be rendered separately by some tense of *vouloir*, *devoir*, or *pouvoir*, in French.

11. Give all the constructions and meanings of "que" in French.

12. When is it desirable to use *lequel*, *laquelle*, *lesquels*, &c., *duquel*, instead of *qui*, *que*, *dont*?

13. In the answers of a dialogue the French language is less elliptical than the English. Illustrate this rule by a few examples, such as—

Is it a letter you are reading?—Yes, *it is*.

Is that quotation from Bayle?—Yes, *it is*.

Do you understand French?—Yes, *I do*.

Are you going away?—No, *I am not*.

14. Conjugate the verbs *venir* and *s'émouvoir*, giving the first person singular and plural of all the tenses, including the compound ones, with the English.

PART II.

Candidates for a Second-class Certificate are to answer the next four grammatical questions, and to translate the English extract and the idiomatic expressions which follow:—

1.—GRAMMAR.

1. Show to what extent the French syntax differs from the English in reference to *personal pronouns*. Illustrate your answer with examples.

2. Will you keep the pronoun in the same case in rendering these sentences in French:—Let *him* read—let *him* read his book; make *him* write—make *him* write his letter.

3. Correct the mistakes here:—*Quoique* vous fassiez, *quelques* soient vos talents, *quelques* honorables que vous soyez, vous aurez toujours des détracteurs.

4. How do you account for the difference in the spelling of these past participles:—

Je les ai *envoyé* chercher par la police.

Je les ai *envoyés* chercher la police.

2.—TRANSLATION.

The service, therefore, rendered by Voltaire in purging history of these foolish conceits, is, not that he was the first by whom they were attacked, but that he was the first to attack them with success; and this because he was also the first who mingled ridicule with argument, thus not only assailing the system, but also weakening the authority of those by whom the system was supported. His irony, his wit, his pungent and telling sarcasms, produced more effect than the gravest arguments could have

done; and there can be no doubt that he was fully justified in using those great resources with which nature had endowed him, since by their aid he advanced the interest of truth, and relieved men from some of their inveterate prejudices.

It is not, however, to be supposed that ridicule was the only means employed by Voltaire in effecting this important object. So far from that, I can say with confidence, after a careful comparison of both writers, that the most decisive arguments advanced by Niebuhr against the early history of Rome had all been anticipated by Voltaire, in whose works they may be found by whoever will take the trouble of reading what this great man has written, instead of ignorantly railing against him.—H. T. BUCKLE.

3.—IDIOMS.

1. Advienne que pourra, je m'en lave les mains.
2. Vous n'y êtes point, je vous le donne en cent.
3. Il a voulu m'en donner à garder.
4. Il n'y va pas de main morte.
5. Vous avez l'air de revenir de Pontoise.
6. A bon chat bon rat.
7. On lui a tiré une plume de l'aile.
8. Il sait faire patte de velours.

PART III.

Candidates aiming at a First-class Certificate are expected to translate the above English extract and idiomatic expressions, and to answer, *in French*, the following questions:—

LITERATURE.

1. What are the principal works of Molière, Pascal, Boileau, and Racine? Give an epitome of one of Molière's comedies or one of Racine's tragedies.
2. Sketch the life of either Madame de Sévigné or Bossuet.
3. Explain the healthy influence of Boileau and the other great writers, his contemporaries, on their age and country.

HISTORY.

State what you know of the administration of Colbert, and name some of the principal measures for which France was indebted to him.

GERMAN.

THREE HOURS ALLOWED.

Each candidate is expected to translate one of the following passages; to answer some of the grammatical questions, and turn into German several of the sentences and pieces given for this purpose. Candidates for a first class must translate one piece of Section I., (e) and (f) of Section II., and 23, 24, and 25 of Section III., and write the Essay.

SECTION I.

1. Ihrem Beispiel folgten auch die übrigen adeligen Herren, Grafen und Ritter. Jeder wollte so unabhängig wie möglich sein. Einen Herrn und Richter über sich zu haben konnte er schwer ertragen; und wenn er sich beschädigt oder beleidigt glaubte, so schaffte er sich lieber mit dem Schwerte Genugthuung, als dass er eine Klage bei dem ordentlichen Richter, oder dem Könige, als höchstem Richter, hätte erheben und den Urtheilspruch abwarten sollen. Diese Neigung mit der Faust sich Recht zu verschaffen, fängt seit Ludwig des Frommen Zeit, der mit seinen eigenen Söhnen das Beispiel gegeben hatte, schon an, und hat sechs Jahrhunderte hindurch in unserm Vaterlande mehr oder weniger geherrscht. Man nennt dieses die Zeit des Faustrechts, wovon weiter unten ausführlicher die Rede sein wird. Doch war es nicht immer gleich arg. Wenn ein kräftiger König regierte, der sich Ansehen zu verschaffen wusste, so ging es doch im Ganzen viel ruhiger und friedlicher zu.

2. Kein Wunder, dass ein so unnatürliches Gericht, das selbst dem duldsameren Geist der Spanier unerträglich gewesen war, einen Freistaat empörte. Aber den Schrecken, den es einflösste, vermehrte die Spanische Kriegsmacht, die auch nach wiederhergestelltem Frieden beibehalten wurde, und, der Reichsconstitution zuwider, die Gränzstädte anfüllte. Karl dem Fünften hatte man diese Einführung fremder Armeen vergeben, weil man ihre Nothwendigkeit einsah, und mehr auf seine guten Gesinnungen baute. Jetzt erblickte man in diesen Truppen nur die furchterliche Zerstörung der Unterdrückung und die Werkzeuge einer verhassten Hierarchie. Eine ansehnliche Reiterei, von Eingeborenen errichtet, war zum Schutze des Landes hinreichend und machte diese Ausländer entbehrlich. Die Zügellosigkeit und Raubsucht dieser Spanier, die noch grosse Rückstände zu fordern hatten, und sich auf Unkosten des Bürgers bezahlt machten, vollendeten die Erbitterung des Volks und brachten den gemeinen Mann zur Verzweiflung.

3. Schnell fertig ist die Jugend mit dem Wort,
Das schwer sich handhabt, wie des Messers Schneide
Aus ihrem heissen Kopfe nimmt sie keck
Der Dinge Maass, die nur sich selber richten.
Gleich heisst ihr alles schändlich oder würdig,
Bös oder gut—und was die Einbildung
Fantastisch schleppt in diese dunkeln Namen,
Das bürdet sie den Sachen auf und Wesen.
Eng ist die Welt, das Gehirn *weit*.
Leicht bei einander wohnen die Gedanken;
Doch hart im Raume stossen sich die Sachen;
Wo eines Platz nimmt, muss das Andre rücken—
Wer nicht vertrieben sein will, muss vertreiben;
Da herrscht der Streit, und nur die Stärke siegt.
Ja, wer durchs Leben gehet ohne Wunsch,
Sich jeden Zweck versagen kann, der wohnt
Im leichten Feuer mit dem Salamander,
Und halt sich rein im reinen Element.

4. Ausführlich und umständlich, wie es der König liebt.
Ich erzähle, wie zuerst zu St. Omer die bilderstürmerische
Wuth sich zeigt. Wie eine rasende Menge mit Stäben,
Beilen, Hämmern, Leitern und Stricken versehen, von
wenigen Bewaffneten begleitet, erst Kapellen, Kirchen und
Klöster anfallen, die Andächtigen verjagen, die ver-
schlossenen Pforten aufbrechen, alles umkehren, die
Altäre niederreissen, die Statuen der Heiligen zerschlagen,
alle Gemälde verderben, alles, was sie nur Geweihtes,
Geheiligt anreffen, zerschmettern, zerreißen, zertreten.
Wie sich der Haufe unterwegs vermehrt, die Einwohner
von Ypern ihnen die Thore eröffnen. Wie sie den Dom
mit unglaublicher Schnelle verwüsten, die Bibliothek des
Bischofs verbrennen. Wie eine grosse Menge Volks,
von gleichem Unsinn ergriffen, sich über Menin, Comines,
Verwich, Lille verbreitet, nirgend Widerstand findet, und
wie fast durch ganz Flandern in einem Augenblick die
ungeheure Verschörung sich erklärt und ausgeführt ist.

SECTION II.—GRAMMAR AND IDIOMS.

(a) When do you use *mein*, *dein*, &c., in the Nom. Masc. and Neuter, and when *meiner*, *meines*, *deiner*, *deines*, &c.?

(b) When must the personal pronouns *he*, *she*, *it*, *they*, be translated by *derjenige*, &c.?

(c) What is the difference between the relative pronouns *wer* and *welcher*?

(d) When must the verb be placed at the end of a sentence?

(e) How do you treat a relative clause of which you omit the relative pronoun and the auxiliary verb, such as "the people, assembled in great numbers, hailed the Princess with enthusiasm?"

(f) *Er macht sich nichts aus ihm* (daraus).

Nehmen Sie sich in acht.

Es liegt mir nichts daran.

Es lag nicht an mir.

Ich will es darauf ankommen lassen.

Jetzt war guter Rath theuer.

Die er für seine wärmsten Freunde hielt, brachten ihn um seinen guten Ruf.

Solches Wetter bringt mich um.

Auf welche Weise kam er um?

Nun galt es die Augen offen halten.

Was gilt's, er lässt sich nichts merken?

Wenn es auf mich ankäme, so sollte ihm die Sache nicht schwer fallen.

Er behauptet, es gälte nichts weniger als das Leben.

Ich werde mich schon zurecht finden, wenn ich nur einmal weiss, wo ich dran bin.

SECTION III.

Translate into German ten of the following passages either in English or German character, but very legible.

1. It has left off raining.

2. The clouds are dispersing.

3. The sky is clear.

4. The weather is getting fine.

5. Let us take a walk.

6. Where shall we go to?

7. Let us go into the park.

8. The gravel there soon dries.

9. How did you spend last evening?

10. I was in a very pleasant company, where they played and sang.

11. Did they play music or at cards?

12. I am no card-player, and never go to a place where I know card-playing is going on, and never stay when they unexpectedly begin to play.

13. No, several ladies played on the piano, some played solos, others duets; and they all played well, and good pieces.

14. You must get your coat mended.

15. He has had his house painted from top to bottom.

16. Make the boy learn his lesson.

17. They caused him to be sent out of the country.

18. I have not been able to answer him as I could have wished.

19. Would you have engaged in such an undertaking if it had been in your power?

20. I have heard it said by several people that he was helped in this essay by more than one person.

21. His wounds were cured through the skill of Mr. N—in an incredibly short time.

22. He was met in his journey by a friend whom he believed to be then travelling in South America.

23. Not having received the information I expected, I refused to enter into any engagement.

24. He relies on your informing him as soon as you have made up your mind to enter upon the proposed emigration.

25. Life has been compared to a river. If ours is not such, it is because its springs are not on the mountain, but in marshes and the lowlands. The peace promised to the good man shall not be like a shower falling with temporary abundance, but like the river which flows by the cottage door, always full and always singing. The man hears it when he rises in the morning; he hears it in quiet noon; he hears it when the sun goes down; and, if he wakes in the night, its sound is in his ear. It was there when he was a child; it was there when he grew up to manhood; it is there now, that he is old and decrepit; and it will murmur by his grave upon its banks; nay, it will flow and sing for his children after him.

Write, in German, a short and concise essay: ON THE UTILITY OF THE STUDY OF LANGUAGES, AS A DISCIPLINE TO THE MIND.

(To be continued.)

Home Correspondence.

THE GROWTH OF COTTON.

SIR,—I am indebted for the following paper to his Excellency Sir Charles Darling, now governor of Victoria, who has taken a great interest in our cotton movement, and has himself an extensive cotton plantation in Jamaica, adjoining the estates of our company.

I am, Sir, yours faithfully,

STEPHEN BOURNE.

Jamaica Cotton Company (Limited),
55, Charing-cross, London, S.W., Sept. 3.

THE "GOSSYPIMUM ARBOREUM," OR TREE-COTTON.

MR. R. C. Kendal, of the United States, not long since delivered a lecture to his countrymen, in which he stated that he had successfully cultivated this cotton in northern parts of America, and he details the manner in which he became acquainted with it as follows:—

"Several years ago, while an *employé* in the Patent Office, I received and accepted a tempting offer from a Chilean gentleman of wealth, Senor Alrogara, to conduct certain matters on his estate. One holiday morning, not very long after my arrival at my temporary South American home, I set out on horseback along the course of a modest little river called the Chipura, and forming the boundary between semi-civilisation and the territory of the Ypurian savages. Resolved to explore as much of my patron's domains as the brief May day would allow, I pushed briskly forward over the already frozen ground, covered fetlock deep with newly-fallen snow, following the windings of the stream, whose sedgy banks of dark rock, generally thrust back, as it were, by alluvial bottoms from one to three hundred yards distant, indicated that the Chipura had one day been a river of ten times its present volume. After a ride of some two hours, in doubling an abrupt turn where the rocks approached very near the water, I came suddenly into a full view of an object some 200 yards distant, which presented the most magnificent spectacle I had ever seen: a perfect cone, a pyramid of pure brilliant snow, elevated at its base, perhaps seven feet from the ground, upon a shaft of whitish bronze, the whole structure cut clean and sharp against the dark wall of rock in the back ground.

"I had in northern countries, after a calm fall of snow, seen many a white pyramid having an internal structure of pine or spruce; but knowing that, in the present instance, the snow had fallen during a violent gale, and observing that none of the pines about me bore any traces of it upon their branches, I rode forward in some bewilderment to investigate the phenomenon. It resolved itself, as I drew near, into a most perfect specimen of *Gossypium arboreum*, the perennial cotton tree. Its foliage had long been shed, but the pods remained, having fully burst, and turned out their spotless samples in almost perfect roses, covering the entire structure with a dense mass of spotless glossy cotton. I had often seen and examined indifferent specimens of the perennial cotton shrub; but I had never seen anything even approaching in perfection that solitary tree. The remainder of that, and many a saint day thereafter, was devoted to intimate companionship with, and diligent study of the habits, peculiarities, and general economy of the beautiful solitaire of the Chipura. Having no facilities for gathering and weighing the yield of that individual tree, my estimate was, of course, only an approximate conjecture; but I would not be willing to fall below 100 lb. as the amount of clean 'lint' afforded by the cone, having a diameter of 12 feet at the base, and measuring a trifle over 18 feet from base to apex.

"Were I to take this solitary wonder as a fair sample of perennial cotton generally, I should be doing gross injustice to the public, to the tree, and no very special credit to myself; for in more than a year's intimate acquaintance with the arboreum family I have found its individual members, under various circumstances, differing from each

other as widely as do the various degrees of humanity, from the monarch to the mendicant.

"I shall endeavour, in my brief description of the tree, to follow the true medium between the two extremes. In its native condition, and in the higher southern latitudes, the average size of the *Gossypium arboreum* equals the medium peach-tree of North America—say, eight inches in diameter at two feet from the ground, and in height twenty feet, in its general structure more nearly resembling the white mulberry tree than any other tree with which I am familiar. The leaves are abundant, distinctly denticulated and of a glossy silvery green, flowers profuse, very double, variegated, and in size about a third smaller than the perfected hollyhock; the tree, when in full bloom, presenting one of the most beautiful effects imaginable. The balls at maturity are twice the size of those borne by the herbaceous plant; and wherever it approached the colder regions, I found its fibre finer and the length of staple increased.

"The perennial cotton-tree is propagated from seed, or more readily from cuttings simply thrust into the ground, and possesses this peculiar advantage in any country over the herbaceous plant. It may be planted out as an apple, pear, or peach orchard, and the field cropped with any of the cereals, until the tree, having reached its maximum standard, should entirely occupy the land. It bears cutting as kindly as any known tree, and in field culture may always be kept so pruned that its produce shall be within reach of the hand. From my own observations, and all the information I have been able to obtain, the perennial cotton is never liable to the vicissitudes of weather or destruction by the numerous insects so inimical to the herbaceous plant. That the *Gossypium arboreum* is to be introduced in our immediate vicinity, and its merits as a cotton bearer amongst us fully tested, is almost beyond a question; for there is present a gentleman of long practical experience in agriculture, and a thorough-going farmer, possessed of ample means, and a fixed determination to take the initiative in an enterprise which, once consummated, will do more towards humanising and Christianising mankind; more towards binding our whole country in the strong bonds of eternal union; more towards banishing discord for ever from among us than all the legislating diplomacy and war that ever distracted civilisation. The period is not very remote when hedges most efficient as fences shall yield annual dividends of superior cotton; ornamental cotton-trees, blending the useful with the beautiful, shall repay tenfold their cost and culture; when the rugged heights of the Hudson, the plains of New Jersey, the fertile valleys of the Keystone state and the undulating prairies of the great West, shall gleam in the sunlight, white as the winter drift, with generous pods of democratic cotton. Having thus communicated the conclusions arrived at after a year's diligent study of the growth, habits, produce and general economy of the perennial tree-cotton, and also detailed the result of my own patient experiments in a latitude where the climate is as vigorous as it is in New York, permit me to introduce testimony towards establishing the fact that cotton can be produced abundantly and profitably in three-fourths of the free states. In the first instance, the cotton-tree of South America does grow both spontaneously and under culture, producing a fine and long glossy staple in high southern latitudes, where snow covers the ground three months of the twelve, seems to be evidence conclusive that it will flourish equally well in latitudes north of the equator corresponding to those of the southern hemisphere, in which it abounds and defies the rigour of a climate that nothing less hardy than a North American apple-tree could withstand.

"As none of the gossypium family, with the single exception of the giant specimen of Borneo, are strictly tropical in their origin, habits, and organisation, there can be no philosophical or practical argument brought forward to prove that even the herbaceous plant, when by skilful treatment and judicious culture it has been changed

into a hard-wooded shrub, may not be grown successfully in any northern region, having a soil suitable to its development, where four months out of the twelve are free from frost. In answer to the almost universal argument in the North—that the season of the free states is not long enough to mature the cotton crop, I would simply say it was a mistake.

"On the 7th of October, 1850, I left Boston for the South. Up to that date there had not been a frost in Massachusetts sufficiently severe to nip the most delicate plants. On the morning of the 15th of the same month, in passing along the streets of New Orleans, I observed ice in the gutters the thickness of ordinary window glass, and, upon inquiry, learned that the place had been visited with frost regularly for ten consecutive nights. That certainly was a somewhat unusual occurrence, but my own observation for many years has been, that beyond the influence of the breeze from the great Mexican Gulf, 'Jack Frost' is quite as early a visitor in the Southern States as he is in Massachusetts. It is true he takes his departure somewhat earlier in the spring, but he returns most inconsistently at times even in Florida.

"Less than twenty years ago it was currently believed and positively asserted by pomological *savans*, that the United States could never become a wine-producing country, because no grape of foreign origin would ripen in its climate. Dr. Underhill, of Croton Point; Nicholas Longworth, of Cincinnati; and a whole army of successful vine growers and wine makers all over the country, have long since proved the fallacy of such reasoning."

Proceedings of Institutions.

IPSWICH MECHANICS' INSTITUTION.—The thirty-eighth annual report states that the committee have not yet succeeded in clearing the current account of the liabilities which have pressed upon it for the last few years, the amount of unpaid bills being about the same as at the last annual meeting. Nothing, however, can be more satisfactory than the financial position of the Institution; and there is one item in the accounts to which your committee can point with great satisfaction, and that is the sum received in subscription from members, which is the largest ever yet received in one year under that head. This, of course, indicates a larger number of members upon the books, another satisfactory index of the position of the Institution. The number reported at the last general meeting was larger than is usual in the summer months, and the number now reported, 665, is larger than has ever been reported. The committee promised at the last general meeting to present at this meeting a detailed financial statement of the funds expended upon the recent improvements in the lecture-hall. The fact that the architect has not yet made his final survey of the works prevent their keeping this promise, as the allowances for abatements on the original contract, and the charges for extras, cannot be known till after that survey is made. It may, however, be briefly stated that £355 has altogether been paid to the contractor, and that a small balance still remains on hand out of the sum raised for the building fund. The committee were empowered at the last annual meeting to raise £150 on loan, but they have not at present raised more than £100, which they have done at four per cent. interest. With regard to the improvements themselves, they have proved most successful, and the committee have reason to hope that the improved value of the hall, as a commercial speculation, will be equally apparent in the next balance sheet. The committee of the educational branch found it advisable this year to wind up its affairs. The educational branch had been going on for several years with a gradually decreasing number of pupils and an increasing debt. The committee are glad to see that an effort is being made in the town to perform the work which was undertaken by

the educational branch, by means of another and perhaps an improved organisation, and, wishing the young Institution every success, they have embraced every opportunity of rendering it assistance. Various books have been added to the library during the year. The committee feel that the present opportunity ought not to be lost for thanking the numerous friends of the Institution who, in the most handsome and liberal manner, have come forward and subscribed over £200 towards a fund for effecting the long needed alterations in the lecture hall, the result being that the Institution has now one of the best lecture-rooms in the eastern counties. The committee cannot but feel that, valuable as is the assistance thus rendered to the Institution in a pecuniary sense, it is still more to be prized as a token of its popularity and a proof that the course which it has pursued of late years is generally approved of. In addition to substantial marks of good-will and assistance already received, your committee have received a letter from Mr. Hunt, offering to make "one with nine others (if such can be found) in presenting £5 a piece, making £50, for the purchase of books for the use of members of the Institute." Since the last annual meeting the Institution has lost a good friend in the person of the late Mr. J. B. Alexander, who had been for many years a Vice-President of the Institution. Since the last annual meeting your secretary has resigned the office of collector, and the librarian has been appointed collector in his place. On the whole the committee feel that there is stronger ground for congratulation at the prosperity of the Institution than ever. It has now the largest number of members on the books, and consequently the largest amount of subscriptions ever recorded. It has a handsome lecture-hall in good repair, and in connection with this building, it should be borne in mind that one cause of the temporary embarrassment in the current funds is the fact that the Institution is regularly investing £2 monthly towards paying off the debt which was contracted when the hall was built. In this manner the original debt of £1,300 has been reduced to about £850, and as soon as it falls to £800, which at the present rate of investment will take place in about two years, there will remain no further necessity for cramping the current income of the Institution by any charges for the liquidation of capital debt, and this will be equal altogether to an increase of £35 annual income. The receipts have been £475, and the outstanding liabilities are £78.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 28th, 1863.]

Dated 18th August, 1863.

- 2046. J. Briggs, Blakely, Lancashire—Certain imp. in coating or covering crinoline steel.
- 2048. H. Robinson, Skipton, Yorkshire—Imp. in lime-kilns.
- 2052. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of hats, caps, and bonnets, and in apparatus employed therein. (A. com.)
- 2054. J. B. V. Faure, Aschaffenburg, Bavaria—Imp. in pen and ink holders.

Dated 19th August, 1863.

- 2058. C. Sonnhammer, Regent-street—An improved fan.
- 2060. T. Scott, Nelson-square—Imp. in the construction of floating docks or apparatus for lifting ships and other bodies.
- 2062. S. Sanderson, High-street, Shoreditch—An improved fastening for leggings, stays, or other articles.
- 2064. R. H. Jackson, Olive Branch Works, Meadow-lane, Leeds—Imp. in machinery for sawing wood and other fibrous substances.

[From Gazette, September 4th, 1863.]

Dated 20th June, 1863.

- 1549. G. Brixey, Maida-hill, Middlesex—Imp. in apparatus and implements for cleaning spoons and forks.

Dated 27th June, 1863.

- 1614. T. Dunn, Windsor-bridge Iron Works, near Manchester—Imp. in the construction and maintenance of the permanent way of railways.

Dated 27th July, 1863.

- 1865. G. Haseltine, 12, Southampton-buildings, Chancery-lanç—Imp. in coal oil lamps. (A. com.)

Dated 28th July, 1863.

1999. Baron A. A. De Rostaing, 29, Boulevard St. Martin, Paris—An improved method of manufacturing iron and steel with cast iron taken in the subdivided state.

Dated 1st August, 1863.

1999. E. Sutton, Palace-road, Well-street South, Hackney—Imp. in fastenings for cigar cases, porte-monnaies, bags, and other like articles.

Dated 10th August, 1863.

1971. R. J. Cunnack, Helston, Cornwall—Imp. in the manufacture of cartridges for blasting and projectile purposes.

Dated 11th August, 1863.

1975. E. Myers, 2, Millbank-row, and Hugh Forbes, 6, Aberdeen-place, Maida-hill—An improved rotary pump.

Dated 13th August, 1863.

1997. J. Ellis, Liverpool—Imp. in machinery for scouring, cleaning, and polishing wheat, rice, malt, grain, and other seeds.
1999. H. Winchcomb, 3, China-walk, Lambeth—Imp. in street pillar letter-boxes and bags for the reception of post letters.
2001. T. Ashwin, Birmingham—A new or improved dress fastening, which said fastening may also be applied to the fastening of braces, belts, and other bands, and to other like purposes.
2003. J. Henderson, Bradford, Yorkshire—Imp. in preparing yarns for printing.

Dated 14th August, 1863.

2009. C. Schiele, Clarence-buildings, Manchester—Imp. in fans, pumps, and machinery for propelling air, fluids, or other substances by centrifugal force.
2011. E. Taylor, Salford, Lancashire—Certain imp. in machinery or apparatus for churning.
2013. F. J. Jones, Aldermanbury—Imp. in locks or fastenings.
2014. M. H. Lishman, Stockton-on-Tees—Imp. in machinery for punching and for marking plates in which holes are to be punched.
2015. M. Siegrist, Ewell, Surrey—Imp. in railway breaks actuated by the pressure of the atmosphere.
2017. J. Wain, Manchester—Imp. in machinery or apparatus for doubling or twisting yarns or threads of cotton and other fibrous materials.

Dated 15th August, 1863.

2019. J. W. Hoffman, Rydon-street—Imp. in apparatus for producing optical illusions for stage effect in theatres or exhibitions.
2021. G. Yates, Oswaldtwistle, Lancashire—An improved means or method of indicating the number of tubs or other measures or quantities of coal or other substance or material drawn from pits or mines.
2025. R. Smith, Manchester, and J. Booth, Gorton, near Manchester—Imp. in the manufacture of paper hangings.
2027. F. Flavell, Welton, Northamptonshire—Imp. in shakers for thrashing machines.
2029. T. Brooks, Wyld's rents, Long-lane, Bermondsey—Imp. in means or apparatus for the production of charcoal and other products from refuse tan and other woody substances.
2031. A. V. Newton, 66, Chancery-lane—Improved apparatus for printing. (A com.)
2033. E. H. Bentall, Heybridge, Essex—Improved machinery for thrashing corn and other grain or seeds.
2035. A. W. Parker, Bristol—Imp. in the manufacture of soap.

Dated 17th August, 1863.

2037. A. M. Dearn, Colchester—A new centrifugal disc mashing machine.
2039. H. A. Bonneville, 24, Rue du Mont Thabor, Paris—Imp. in the processes and preparations employed in spinning wool. (A com.)
2042. T. Loftus, Preston—Imp. in apparatus for attaching to steam boilers and flues for the consumption of smoke.
2043. J. S. Crosland, Ashton-under-Lyne—Imp. in lubricating, and in arrangements and mechanism for lubricating the bearings, journals, or steps of spindles, shafts, axles, and other mechanism.

Dated 18th August, 1863.

2045. J. Arthur, M.D., 1, Robert-terrace, Chelsea—An improved apparatus for the prevention, cure, and relief of hernia of every description, together with prolapsus uteri, uterine hemorrhage, hernia humoralis, and as a general support for enlargement of the abdomen from whatever cause proceeding.
2047. J. Brennan, Burnley—An improved construction of fire bars and apparatus connected therewith.
2049. T. Dobb, Rotherham, Yorkshire—Imps. in chimney tops, which imps. are also applicable to coverings for ventilating shafts or flues for mines and other places.
2050. A. Cruickshank, Glen-park, Lanarkshire, N.B.—Imp. in the manufacture or production of food for cattle and all other domestic animals, poultry, game, and in the machinery or apparatus employed therein.
2051. J. Yates, Rotherham, Yorkshire—Imp. in the manufacture and fitting or securing of armour plates, blocks, or bars, and in the machinery or apparatus employed therein, parts of which imp. are applicable to heavy forgings generally.
2053. R. A. Brooman, 166, Fleet-street—An improved method of and apparatus for treating molasses, syrups, saccharine juices, and other products. (A com.)
2055. C. H. McCormick, Chicago, U.S.—Imp. in reaping machines.

Dated 19th August, 1863.

2057. W. Jackson, 4, Spring-terrace, York-road, Lambeth—Improved arrangement of the parts in sewing machines using shoemaker's wax thread suitable for heavy boot or other leather work to which it may be applied.
2059. T. Howard, Hyde, Cheshire—Certain imp. in machinery for spinning cotton, flax, wool, silk, and other fibrous substances.
2061. G. T. Bousfield, Loughborough-park, Brixton—Imp. in apparatus for feeding weft in hair cloth looms. (A com.)
2063. G. Bonelli, Turin, and H. Cook, Gloucester-square—An improved mode of and apparatus for producing by the aid of photography optical illusions of moving animals and bodies.

Dated 20th August, 1863.

2066. W. Galloway and J. Galloway, Manchester—Imp. in steam boilers, and in steam and water gauges for the same.
2067. S. Hallsworth, Elland, near Halifax, Yorkshire, and T. Platt, Fairfield, near Manchester—Imp. in the manufacture of certain colouring matters known as Prussian blue, Berlin blue, Paris blue, China blue, and Turnbull's blue.
2069. J. Fleming, Newlandsfields, Renfrew, N.B.—Imp. in preserving the colours of dyed fabrics.
2070. J. Platt and W. Richardson, Oldham, Lancashire—Imp. in machinery or apparatus for cleaning cotton and wool from seeds, burrs, and other extraneous matters.
2071. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for winding narrow laps of wool.
2072. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of cartridges. (A com.)
2073. C. D. Hammond, M.D., Charlotte-street, Bedford-square—Imp. in apparatus for the treatment of certain bodily ailments.

Dated 21st August, 1863.

2074. J. F. Hill, 23, Little St. Andrew-street, Upper St. Martin's-lane—An improved ventilating gas lamp or gaselier.
2075. J. Eccleston, Manchester—Imp. in apparatus for economising or regulating water power used for blowing organs or harmoniums, which improvements are also applicable for other purposes where an irregular motive power is desired.
2078. R. A. Brooman, 166, Fleet-street—Imp. in expressing and filtering oil from seeds, and liquids from other substances containing the same, and in apparatus employed therein. (A com.)
2079. W. Evans, Belgrave-street, Commercial-road-east—An improved artificial fuel.
2080. R. Griffiths, Mornington-road, Regent's-park—Imp. in the construction of retorts or ovens for extracting oil from certain descriptions of cannel coal or other bituminous substances.
2081. E. Pope, Clonmel, Ireland—Imp. in breech-loading fire-arms.

Dated 22nd August, 1863.

2083. T. Pegram, 22, Cardington-street, St. Pancras—A plate holder for the photographic camera, adapted to carry different sized plates, each plate being on the same plane and in the same focus.
2084. R. A. Brooman, 166, Fleet-street—Imp. in closing powder canisters and other vessels. (A com.)
2085. A. Watson, King-street—An improved method of and apparatus for inserting pictures in and withdrawing them from photographic albums.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2102. J. W. Friend, Freemantle, Southampton—Imp. in the construction of gas meters, and in apparatus to be employed in connection therewith for regulating the pressure and flow of gas to the same.—26th August, 1863.

PATENTS SEALED.

[From Gazette, September 4th, 1863.]

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|--------------------------------------|--------------------------------|
| September 2nd. | 677. W. Clark. |
| 649. J. Isherwood. | 681. J. Harris, J. Butler, and |
| 653. P. Hugon. | 691. J. H. Fraser. |
| 655. W. J. Clapp and N. Coats. | 739. A. Morel. |
| 660. R. T. Monteilh and R. Monteilh. | 761. W. Clark. |
| 670. J. Werge. | 768. R. Mushet. |
| 671. J. Tomlinson. | 1602. R. Mushet. |
| | 1648. E. Lloyd. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 8th, 1863.]

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| 31st August. | 2166. J. Hamilton, jun. |
| 2114. W. Holroyd and S. Smith. | 2186. W. Wilkinson and H. T. Wright. |
| 4th September. | 5th September. |
| 2133. G. P. Wheeler. | 2212. J. Chesterton. |
| 2134. G. P. Wheeler. | |
| 2153. R. Wright. | |

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, September 8th, 1863.]

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| 2nd September. | 4th September. |
| 2062. B. O'N. Stratford. | 2093. F. M. Herring. |
| 3rd September. | 5th September. |
| 2070. R. Wilson. | 2089. J. Fowler, jun. |